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An Attempt to Measure the Trends in Shadow Employment in Poland

The Transition Probabilities out and into Shadow Employment Using the LFS Data Augmented by the Results of a Dedicated Survey Performed by CASE in 2007

Mateusz Walewski

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Abstract

This paper presents the results of an attempt to use the combined results of the dedicated survey performed by CASE in 2007 and Polish LFS data in order to: (a) analyze the development of the shadow employment in Poland in years 2003–2008 and, (b) analyze the transition probabilities in and out of shadow employment. The estimated share of shadow workers in total employment in Poland in years 2003–2008 was increasing until 2006 and then started to decrease in the years 2007 and 2008. Other results are in line with one of the main conclusions of the CASE study from 2007 suggesting that shadow employment is more a way of coping with lack of other employment opportunities than an equivalent or even superior alternative to any legal employment contracts. On the other hand those who enter shadow employment are more active part of the group having problems with finding full time/open term employment. They are much more inclined to cope with their situation by entering some form of self-employment than to stay passive and depend on social assistance.

This paper is a product of the Human Development Economics Unit, Europe and Central Asia Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at Mateusz.Walewski@case-research.eu.

An attempt to measure the trends in shadow employment in Poland

The transition probabilities out and into shadow employment using the LFS data augmented by the results of a dedicated survey performed by CASE in 2007.[1]

Mateusz Walewski

[1] This paper—a product of the Human Development Economics Unit, Europe and Central Asia Region—is part of an effort to understand the underlying factors that determine the size of informal employment in the shadow economy, providing background technical analysis for a forthcoming World Bank regional study "In from the Shadow: Integrating Europe's Informal Labor". Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted as follows: Mateusz.Walewski@case-research.eu

1. Introduction

The phenomenon of shadow employment in Poland is monitored by the Polish Central Statistical Office (CEO). The estimates of the number of the shadow employees in Poland are published annually in the Statistical Annuals. Apart from that, more detailed assessments were performed three times between the years 1995 and 2004 by the dedicated irregular module of the Labor Force Survey (LFS) performed in Poland on a quarterly basis. According to CEO estimates, the number of shadow employees in Poland in years 1995-2006 fluctuated between 663,000 in 1998 and 1,079,000 in 2006 - from 4.3% to 7.3% of total employment in Poland.

Unfortunately, the micro-data from the dedicated survey tend not be made available for researchers for further analysis and therefore anyone willing to analyze this issue more deeply has to either conduct an additional dedicated survey or try to estimate the number of shadow employees using the existing information.

As a result, a number of dedicated, mostly one-off surveys of the shadow employment in Poland have been performed by other institutions. In 1994 and 1997, such surveys with samples of 1,000 people each were performed by The Gdansk Institute for Market Economics and published in Grabowski (2002). Another survey was performed by the CEBOS company in 2004 (CEBOS, 2005). The former indicated that the share of shadow employees in Poland decreased from 29.6% in 1994 to 14.1% in 1997. According to the latter, the estimated share of shadow employees amounted to about 13% in 2004.

The two biggest dedicated surveys of shadow employment in Poland were performed in 2007. They were run independently by two institutions, both commissioned by the Polish Ministry of Labor and Social Affairs.

One of surveys was performed by the Institute of Labor and Social Affairs in cooperation with CEBOS institute. According to its results out of the total sample of 9,038 persons aged 15+ interviewed 4.8% answered that they performed any unregistered work within 12 months before the interview. Taking into account that according to the LFS, the employment rate in Poland in 2007 was 48.6% it means that the share of shadow employment in total employment amounted to about 9.9%.

The second survey was performed by CASE (Center for Social and Economic Research) in co-operation with Millward Brown SMG/KRC institute. The number of people interviewed during this survey was 18,121. Following the best practice for similar surveys, the respondents of this survey were not asked directly about their shadow activities. The status of their jobs has been identified by the researchers based on a series of questions concerning the kind of working agreement, wage arrangements and tax and social security payments. According to the results obtained, 9.3% have been identified as having fully or partially unregistered jobs either in their main or additional working place. Although the size and the methodology of the two surveys differed, the results obtained have been surprisingly close suggesting that they reveal the actual figures more or less.

This paper presents the results of an attempt to use the results obtained by the CASE survey in order to: (a) analyze the development of the shadow employment in Poland in years 2003-2008 and, (b) analyze the transition probabilities in and out of shadow employment. This analysis will allow us to verify the hypotheses about the nature of shadow employment. Is it the way to registered employment or a closed avenue leading either to the next shadow

employment or to unemployment? The results obtained by the CASE survey indicated that the latter is closer to the truth, although one has to remember that any conclusions have been obtained based on cross-sectional data only.

Here we will have the opportunity to run the analysis exploiting the quasi-panel nature of the Polish LFS. It will enable us to observe the changes of the relative labor market position of those with higher probability of shadow employment in the booming labor market of Poland during most of the analyzed period. We will also be able to say something about the counter-cyclicality and pro-cyclicality of shadow employment in Poland.

2. Data and Definitions

The data used for the analysis are as follows: the dedicated CASE survey performed in 2007 (later called CASE_2007) and the micro-files from the Polish LFS data from years 2003-2008.

The results of the CASE 2007 survey enable one to analyze shadow employment according to several definitions. According to the narrowest one, the shadow employees are only those working without any written contract, i.e. those with verbal agreements only. It is obvious that these workers neither pay any taxes and/or social contributions, nor are they covered by any rules regulating the standard working contract. Those who are self-employed running their business activities without being registered are a very similar group as they do not pay any taxes nor are protected by any legal regulations. The other groups are those having some kind of written contract or registration but either not paying any taxes and/or social contributions, or employees obtaining part of their salaries "in envelope" or the self-employed hiding part of their revenue in order to avoid taxes.

The methodology of creating the proxy variables for shadow employment in the LFS data was based on the idea of predicting the probability of shadow employment for individual workers in LFS, using the previous estimated coefficients of the probabilistic models in the CASE_2007 database. This methodology is based on the idea of Propensity Score Matching; however in this case, different data sets are used for model estimation and for calculating the "propensity scores".

The first step of the analysis was to select the groups of shadow workers to be used for the analysis, i.e., the groups of shadow workers to be later "matched" by observations from the LFS data-set. For the reasons of analytical clarity, it was decided to use only those working without any written contract and those working with some form of written contract but not paying any taxes or social security contributions (later called shadow employees) and the same group extended to self-employed (or employers) with unregistered firms (latter called shadow workers). In either case, only those who were employed in the shadow sector in their main job have been taken into account. Further in text both of these groups are referred to as shadow workers according to basic definitions.

The next step was to identify the set of explanatory variables to be used in the "matching models". The important limitation was that all the explanatory variables used in the model specification had to be transformable so as to achieve common definitions and categories for CASE_2007 database and for each and every LFS database used in the further course of the analysis (for years 2003-2007).

The following set of variables fulfills the condition above and has been used for the "matching":

- Region – 16 Polish *voivodships*
- Gender
- Position in household head – head, partner, other
- Age – age groups - 15-24, 25-34...., 65+
- Education level - Tertiary, Secondary Professional, Secondary General, Vocational, Below Vocational
- Civil Status - Free, Married, Widow(er), Divorced
- Economic Activity – Agriculture, Mining, Manufacturing, Communal Services, Construction, Trade and repairs, Hotels and Catering, Other market services, Non-market services (education, health, administration aso), Persons working for private households, Other.
- Size of the company - below 10, 10-49, 50-100, more than 100, does not know
- Ownership – private or mixed, public
- Contract – Full time and Open Term, Full time and Fixed Term, Part Time and Open Term, Part Time and Fixed Term, Self-Employed.

The contract variable deserves special attention here as it plays a decisive role in matching and therefore has to be used in the model specification. At the same time, it creates the most important econometric and analytical problems during the initial estimation and then during the prediction (matching) procedure.

The problem results from the fact that the workers who declared to be employees with verbal agreements in CASE_2007 had to be classified in "contract" variable to one of categories. It appeared most logical and closest to their actual labor market status to classify them all as fixed term workers. Then, some of them were classified as full time and some as part time workers using the information about the actual hours they worked - working for less than 30 hours per week has been considered part-time work. This was important for our results as it seriously increased the number of those in shadow employment among the fixed term workers (so we additionally reinforced the significance of this variable in our model(s) by definition) and the resulting estimated average probabilities of shadow employment in LFS for each year are strongly correlated with the changing share of fixed term employees in total employment. There are two strong arguments to apply this procedure:

(1) Those with 'verbal agreements only' are one of the biggest and "purest" groups of shadow employees; therefore, they have to be taken into account in our analysis,
(2) One may very reasonably assume that a verbal agreement is much more similar to a fixed term than to an open term contract and that many of those with verbal contracts fixed term employment in a LFS.

The general trend in shadow employment has also been estimated applying two alternative ways:

(1) The versions of the models for the same definitions of shadow employment variables but without the "contract" variable in the models' specifications,
(2) The new variable has been created representing shadow employment where those with verbal contracts have not been taken into account and the "contract" variable has been used as one of the explanatory variables. We refer to this definition of shadow

employment as the narrow one in the following text, as opposed to the basic one described earlier.

Therefore there are three estimation procedures used to identify the workers in LFS matching of the shadow workers from the CASE 2007 database:

- Estimations where basic definitions were used and the contract variable was included into the model specification
- Estimations where basic definitions were used but without the contract variable in the model specification
- Estimations with narrow definitions of shadow employees and workers used and with the contract variable used in model specification.

Simple Probit and Logit models have been estimated for variables representing various definitions of shadow employment on the left hand side and all variables created on the right hand side of the model in the basic case. The models have been estimated using the CASE_2007 dataset. In the estimations the employees, the self-employed and the employers have been excluded from the sample. The mining sector has been excluded from all estimations as there were no shadow employees working in this sector and hence it predicted failure (i.e. legal employment) in 100% of cases.

The estimated coefficients have then been used to predict the probabilities of working in shadow employment in the LFS 2003-2008. As a result 12 variables with various shadow employment proxies (probabilities) have been obtained for each employed in the LFS samples:

- 4 for the basic case (from logit model for employees only, from probit model for employees only, from logit model for employees and self-employed and from probit model for employees and self employed),
- 4 for the respective models without "contract" variable in specifications and
- 4 for respective models where narrow definitions of shadow employment where applied (i.e. excluding those with verbal contracts).

3. Results on the General Trend in Shadow Employment in 2003-2008

The resulting general trends estimates for the share of shadow employment in total employment are very similar for both logit and probit models (see Table 1 – all rows). The results (in terms of trends) do not significantly differ between shadow employees and shadow workers either. The observed absolute values differ obviously as for the latter the definition of shadow employment is broader. (See Table 1 – all rows.)

There are significant (and obviously expected) differences in absolute values of estimated average probabilities depending on definition of shadow employment used (broad (basic)-including those with verbal contracts only vs. narrow – without those with verbal contracts) (compare Table 1 rows 1-8 with rows 9-12.). The trends however are very similar to those observed for the basic case.

On the other hand there are significant differences in time trends observed depending on model specifications for basic definitions of shadow employment (compare Table 1 rows 1-4 with rows 5-8).

Table 1 Average predicted probabilities of employment in shadow economy according to all definitions of shadow employment and model specifications

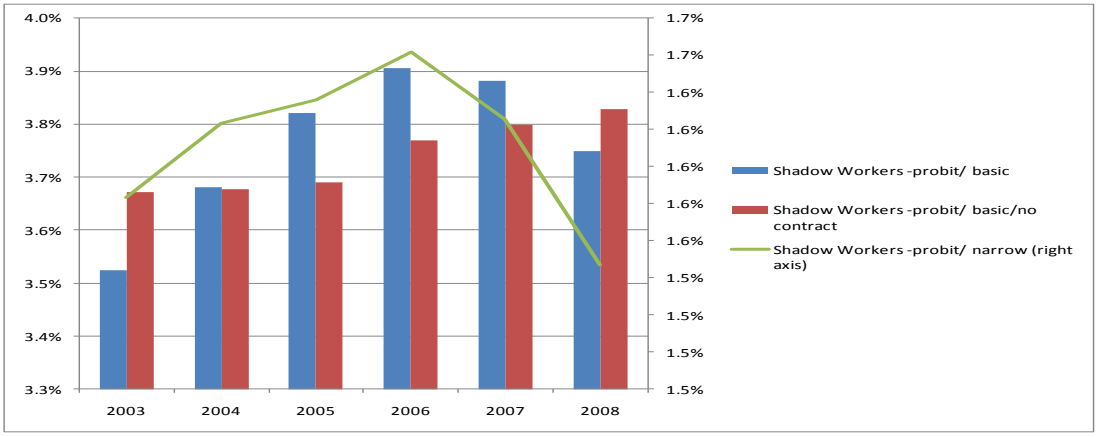
Row	Model	Dependent variable	Years					
			2003	2004	2005	2006	2007	2008
Basic version - basic definition of shadow employment, all variables used in estimated models								
1	Logit	Shadow employees	2.6%	2.9%	3.1%	3.2%	3.3%	3.2%
2	Probit	Shadow employees	2.6%	2.9%	3.1%	3.2%	3.3%	3.2%
3	Logit	Shadow workers	3.5%	3.7%	3.8%	3.9%	3.9%	3.7%
4	Probit	Shadow workers	3.5%	3.7%	3.8%	3.9%	3.9%	3.7%
Basic definition of shadow employment – estimated models without "contract" variable								
5	Logit	Shadow employees	2.7%	2.8%	2.8%	2.9%	3.1%	3.3%
6	Probit	Shadow employees	2.8%	2.8%	2.9%	3.0%	3.1%	3.3%
7	Logit	Shadow workers	3.6%	3.6%	3.6%	3.7%	3.7%	3.8%
8	Probit	Shadow workers	3.7%	3.7%	3.7%	3.8%	3.8%	3.8%
Narrow definition of shadow employment (without those with oral agreements only)– all variables used in estimated models								
9	Logit	Shadow employees	0.5%	0.6%	0.6%	0.7%	0.7%	0.7%
10	Probit	Shadow employees	0.5%	0.6%	0.7%	0.7%	0.8%	0.7%
11	Logit	Shadow workers	1.6%	1.6%	1.6%	1.6%	1.6%	1.5%
12	Probit	Shadow workers	1.6%	1.6%	1.6%	1.7%	1.6%	1.5%

Source: Authors calculations based on LFS data 2003-2008 and CASE 2006 survey database.

The resulting general trend estimates for 2003 -2004 from probit models for shadow workers (including employers) are presented on Chart 1 to better illustrate the results obtained. Only results of the probit models are presented for the sake of clarity, as the results did not differ substantially between logit and probit models' shadow employment proxies.

All estimations, where explanatory variables are used to obtain the proxy for shadow employment, show that the share of shadow employment was increasing between 2003 and 2006, and after 2006 it started to decrease. On the other hand, the results of estimations without the contract variable show something else – increasing share of shadow workers in total employment over the entire period. These two are the qualitatively different results but these differences seem to be relatively easy to explain.

Chart 1 – Estimated general trends for shadow workers (probit models)



Source: Data from Table 1

The probability of shadow employment estimated according to the basic definition is, by design, strongly dependent on the form of contract declared by the respondent in LFS. It significantly increases if the declared employment contract is fixed term. The share of such contracts in Poland was strongly increasing in years 2003-2006 whereas in 2007-2008 it started to stabilize and then decrease. The measured average probability of shadow employment tends to follow the same path.

It seems that both of these trends are related to the general developments in the Polish labor market. One has to remember that in 2003 the unemployment rate in Poland was very high reaching on average 19.5%. Then it started to decrease slowly reaching 17.8% in 2005 and 13.8% in 2004. Then the pace of unemployment rate decrease accelerated even further falling to only 7.1% in 2008. It seems that the sharp increase of the number of fixed term contracts was one of the deciding factors in the gradual fall of unemployment rate in Poland between 2003 and 2005. The labor market situation was still difficult and workers were still very likely to accept fixed term jobs. At the same time, companies did not have to compete for workers with better working conditions. After 2006 when the labor market situation started to improve very dynamically, the companies started to offer them better (more stable) working conditions and workers were more reluctant to accept fixed term jobs. It is logical to assume that similar patterns of behavior exist also in shadow employment which by most of related literature is assessed as counter-cyclical.

On the other hand, the shadow employment proxy constructed without the contract variable does not have any explanatory variable. It shows that as unemployment was falling, more people with low employability started to get jobs. Additionally more jobs were also created in services and construction sectors – traditional hubs of shadow employment. Hence this proxy seems to be naturally "pro-cyclical" – i.e. it increases as the labor demand grows.

It seems that one should have a clear idea what definition of shadow employment and model specification will be used and why. There are strong arguments to use the basic definition and specification, although it results in artificial and excessively strong interdependence between the kind of contract declared by the respondent and shadow employment probability.

One has to take into account that **those without any written contracts are the "core" of shadow employment** – they do not pay any taxes or social contributions and they are not protected by any labor regulations. It means that anyone willing to analyze shadow employment has to take them into account in estimations and hence they have to be classified into some kind of contract as available in LFS database (full/part time, fixed/open term). The kind of contract is also the only information available in the LFS directly related to the concept of shadow employment. It strictly describes the nature of employment in relation to sectors or personal characteristics of the employed.

The contract variable also has strong explanatory power for shadow employment when narrow definitions are used (so our additional reinforcement is not crucial here) and that is why the estimations when narrow definition is used produce more or less similar shadow employment results as the basic version.

Last but not least, significant share (around 17% according to the CASE_2007 survey) of those employed on fixed term basis in Poland do not have the standard employment contract but so called "civil contracts" and their labor relations are not protected by labor law and labor courts. It means that although their contracts are legally binding, officially accepted and

they pay taxes and social security contributions, their actual "employee rights" do not significantly differ from those employed in the shadow economy.

As a consequence it has been decided to use estimated shadow employment probabilities based on the basic definitions of shadow variables and full model specification in the further course of the analysis.

As the last step of this part of the analysis, the general trends of estimated shadow employment for various groups in the labor market were also calculated. Some of the results obtained were quite interesting although not particularly surprising. The differences in the average size of estimated shadow employment for various groups resulting from the model are quite standard.

For example, the average incidence of shadow employment in the period analyzed is higher for younger (below 24) and older (above 64) workers (8.7% and 5.5% respectively) than for other groups (3.3% on average). The probability of shadow employment is also the highest for those with only basic education (9.7% on average), and it falls as education attainment rises to 0.9% for those with university degree. It is, on average, the highest for those employed for private households (more than 50%) followed by construction (11.8%), agriculture (8.6%) and hotels and restaurants (6.6%). The share of employed in shadow economy is also higher in small firms with less than 10 employees (7.5% on average), and to a lesser extent for those working in companies between 10 and 50 workers (2.5%).

The time trends for most employers seem to follow the general path with the estimated incidence of shadow employment increasing until 2007 and then decreasing in construction, hotels and restaurants and also for all sizes of firms. On the other hand, interesting things happen for some groups of workers. The probability of entering shadow employment has been decreasing for the entire period for the youngest cohort and increasing for those close to pension age. The former might be related to the changing demographic situation with decreasing number of young people entering the labor market both due to natural reasons and increasing participation in tertiary education. The latter may result from changes in the disability pension system limiting the access to these kinds of benefits and resulting in increasing number of older workers with relatively low employability looking for jobs.

At the same time, the estimated probability of shadow employment kept constantly increasing for those with secondary education only, indicating a weakening position of this group in the labor market.

Last but not least, one should also observe that the estimated share of shadow employment was practically stable throughout the analyzed period for groups of workers divided according to the type of contract. It is a consequence of the strong interdependence of contract and shadow variables and it proves that most of the changes in estimated shadow employment have been driven mainly by changing structure of employment contracts.

4. Shadow Employment and Labor Market Transitions

In order to run the analysis of labor market transitions between various kinds of labor market statuses using the data from the Polish LFS, one has to take advantage of its quasi-panel nature. Each interviewee in LFS takes part in the survey four times (on a quarterly basis) with two quarters of brake after the second interview. It means that there is exactly one year of break between the first and the third interview and between the second and the fourth interview. It is then possible to create a set of databases consisting of a series of biannual

panels each enabling us to observe the situation of individuals over two consecutive years. 5 such data sets have been created for years 2003/2004 to 2007/2008.

At first, I tried to analyze whether working in shadow employment increases the probability of losing or quitting a job and whether this interdependence changed over the analyzed period. This has been performed by estimating the series of probit models in which the probability of transition out of employment between "t" and "t+1" has been set as the dependent variable and estimated probability of working in shadow employment[2] ("shadow") in period "t" has been one of explanatory variables. Apart from that, I used the set of standard control variables, all for period "t" such as: region, age, gender, education level, and characteristics of employing company.

Three versions of the model have been estimated for each year. One in which both the "contract" variable and the "shadow" variable have been added to model specification, and two with only one of those variables used.

The estimated coefficients on control variables have been as expected - a negative relationship between education level and transition probability, and the lowest transition probability for those in prime age and higher probabilities for females.

The contract variables are significant and similar for both specifications for all years (see Table 2). All employment contracts increase the probability of transition out of employment as compared to full time and open term contracts. It also seems that between years 2003-2007, when the labor market situation was clearly improving, the influence of the fixed term employment on the probability of losing a job was weakening, and then it started to gain importance. What makes this result unexpected is that this tendency started to change already in 2007 when the labor market was still blossoming.

Being a self-employed employee negatively influenced the probability of losing a job until 2006, but afterwards it lost its significance. This may mean that the booming economy strongly awards those deciding to run their own business, be it registered or unregistered. Most probably if our analysis continued until the crisis year, the estimated coefficients for self-employment would become significant again, but with the opposite sign.

The estimated coefficients for the 'shadow' variable seriously depend on model specification. Due to its high correlation with contract variable, it appears not to be significant for transition probability out of employment if both variables (i.e. "shadow" and "contract") are used in model specification. They become significant only if the contract variable is excluded from the analysis.

As one could expect, working in shadow economy positively influences the probability to lose employment. It seems also that in the period where labor market situation was improving (years 2003-2007), the relative situation of those in the shadow sphere also tended to improve, although in absolute terms it was still much worse as compared to the legally employed. In 2008, when one could already feel the first symptoms of the crisis, the relative probability of losing a job increased for those in the shadow sphere.

It means that the labor market situation of those working in any non-standard working arrangement - be it in shadow economy or even registered - is much more dependent on the general situation of the labor market than for those working full time and an open term basis.

[2] The probabilities of shadow employment predicted by probit models with full specification and basic definition of shadow employment have been used in all estimations below.

It is a quite obvious and standard conclusion. What seems to be new here however is, that those in shadow sphere are, most probably, the last to gain from the economic upturn and the first to lose when economy start to contract.

Table 2 - The estimated coefficients of contract and shadow variables on transition from employment to non-employment (from probit model)

Model/variable	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**	**2007/2008**
Shadow – only shadow variable used	0.19951	0.17448	0.15636	0.12734	0.15915
Shadow – both variables used	insignificant	insignificant	insignificant	insignificant	insignificant
Contract – only contract variable used					
full time, fixed term	0.07527	0.05689	0.05494	0.0507	0.055
part time, open term	insignificant	0.01898	0.037	0.0151	0.02276
part time, fixed term	0.07776	0.06582	0.0562	0.07629	0.07441
Self employed	-0.04458	-0.02622	-0.02733	insiginficant	insignificant
Contract – both variables used					
full time, fixed term	0.0758	0.05403	0.05331	0.05355	0.05368
part time, open term	insignificant	0.01861	0.03671	0.01552	0.02267
part time, fixed term	0.07986	0.05371	0.0494	0.09214	0.06817
Self employed	-0.04452	-0.0263	-0.02742	insignificant	insignificant

Source: Author's calculations based on CASE_2007 database and LFS databases for years 2003-2008
Notes: Base category for contract variable = full time, open term contract. All coefficients in dF/dX forms i.e. they represent the change in probability resulting from the unit change of independent variable (in case of "shadow" variable) or the change in probability for category X as compared to the case category.

Second, I tried to check whether transition from non-employment to employment is related to increasing probability of having a shadow job. This analysis has also been performed by estimating the series of probit models for each year. The probability of transition to employment between "t" and "t+1" has been a dependent variable and estimated probability of working in shadow employment ("shadow") in period "t+1" has been one of the explanatory variables. Apart from that, the same set of standard control variables were used, all for the period "t+1". Here, three versions of the model have been estimated for each year: one in which both the "contract" and the "shadow" variables have been added to the model specification, and two with either of the variables used.

In this case one cannot say that the estimated coefficients of the control variables were as expected as it is not so obvious what the expectations should be. One has to remember that it is not the probability of finding a new job by an unemployed being estimated, but the probability that a given person is a new employee provided she/he is employed at all. So in general it tells more about the changing (tenure/age) structure of employment or job rotation than about job creation. It is, however, perfectly sufficient from the point of view of our task as what we are interested in is the relationship between being a new employee and being in the shadow sphere.

The shadow variables are significant in both models (see Table 3), although the estimated size of coefficients significantly differs. In either case, however, it seems that the probability of being in shadow employment is positively correlated with the fact of being a new employee (or the new self-employed).

It also seems that the strength of this relationship decreased for the entire period analyzed which seems to be an interesting observation. It does not mean that as the labor market kept improving, new workers were hired legally more often. It only means that there was a weaker relationship between the very fact that they are new workers with a high probability to enter

shadow employment. In fact, the estimated share of shadow workers among the new workers has been stable and then increasing until 2007. It fell only in 2008, almost exactly copying the dynamics of the general estimated share of shadow employment in total employment (see last raw of Table 3). In other words; although the general observed probability of employment in shadow economy for new workers kept increasing until 2007, this increase was not necessarily related to the fact that they were new.

The analysis of the "contract" coefficients leads to similar conclusions. It seems obvious that the newly hired are more often employed fixed term and also to some extent part time. More precisely, the fact that an employed person is on a fixed term contract increases the probability that she/he is newly hired. This tendency (similarly as in case of shadow employment) seems to weaken over the analyzed period, although the results here are not so clear. The part time and fixed-term employment coefficients fell until 2005, and then started to stabilize and increase. Once again these results tell us that any kind of employment other than full time and open term contracts is less and less dependent on the fact that the person is newly employed. Actually, the share of such contracts among the newly employed was increasing until 2007 and then decreased in 2008 copying the general trend (see Table 4 – last row).

Table 3 - The relationships (estimated coefficients) between being a new employee, shadow employment and the type of contract

Model/variable	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**	**2007/2008**
Shadow – only shadow variable used	0.37154	0.30424	0.29312	0.30844	0.27085
Shadow – both variables used	0.08605	0.079	0.06387	0.04184	0.03406
Contract – only contract variable used					
full time, fixed term	0.25178	0.21509	0.18054	0.2046	0.16998
part time, open term	0.0625	0.03078	0.05713	0.0434	0.06489
part time, fixed term	0.30764	0.21786	0.21479	0.25631	0.25355
Self employed	0.02912	0.01158	insignificant	0.02537	0.02223
Contract – both variables used					
full time, fixed term	0.22049	0.18887	0.16123	0.18912	0.15669
part time, open term	0.05209	0.02432	0.05182	0.03824	0.05606
part time, fixed term	0.21681	0.14191	0.15605	0.21274	0.21071
self employed	0.0189	insignificant	insignificant	0.02086	0.01549
The estimated share of shadow employment in total employment among the newly employed.					
% of all newly employed in shadow employment	8.7%	8.7%	9.1%	9%	8.5%

Source: Author's calculations based on CASE_2007 and LFS datasets for Poland.
Notes: Base category for contract variable = full time, open term contract

The last step of the analysis is to examine the relationship between shadow employment and relative probability of transitions between various types of labor contracts or out of employment. However before engaging in an econometric estimation, it is interesting to observe the actual labor market transitions for groups with various labor market positions.

It is obvious that for any type of labor arrangement the highest is the probability that in the next year – "t+1" (see Table 4) the labor market status will be the same as in current year – "t". The continuation of the same labor market arrangement is the most natural behavior on the labor market. On the other hand, the strength of this stability depends on the nature of the labor market arrangements as such and also on the general situation of the market.

At first those with full time and open term contracts and the self employed are the two most stable groups. Over the entire period, more than 90% of those with either of these working arrangements in time "t" did not change it within a year. The same applies to those who are

not employed. It is quite an expected result, but it is also important from the point of view of the shadow employment analysis as the self-employed are among those with higher probability of engagement in shadow activities.

As one could also expect those with part time and fixed term contracts are the least stable group. Only 50% to 60% of persons working on this type of contract continue the same working arrangement in the next year. These are also the groups with the highest transitions out of employment, as stated earlier. What seems important is that the observed transitions out of employment tend to decrease for these groups until 2007 and stabilize in 2008. At the same time, one observes increasing transitions to full time (fixed term contracts) but not to full time or part time open term contracts.

Table 4 Observed transition probabilities between for various types of employment contracts between t and t+1.

Contract -"t"	Contract -"t+1"	2004	2005	2006	2007	2008
Full time, open term	full time, open term	90.4%	92.9%	91.7%	93.7%	92.6%
	full time, fixed term	1.4%	1.2%	2.0%	1.5%	1.8%
	part time, open term	0.5%	0.3%	0.3%	0.3%	0.4%
	part time, fixed term	0.2%	0.2%	0.2%	0.1%	0.1%
	self employed	0.9%	0.7%	1.0%	0.7%	1.0%
	NOT EMPLOYED	6.6%	4.8%	4.8%	3.7%	4.2%
Full time, fixed term	full time, open term	17.7%	13.4%	15.8%	15.4%	19.2%
	full time, fixed term	61.3%	70.6%	68.4%	71.9%	66.2%
	part time, open term	0.3%	0.1%	0.2%	0.3%	0.3%
	part time, fixed term	1.6%	0.9%	0.8%	1.0%	0.8%
	self employed	1.7%	2.1%	2.2%	1.6%	1.6%
	NOT EMPLOYED	17.4%	12.9%	12.6%	9.8%	11.9%
Part time, open term	full time, open term	13.6%	8.3%	13.2%	11.6%	15.8%
	full time, fixed term	1.3%	0.6%	1.5%	3.2%	3.4%
	part time, open term	70.8%	77.5%	69.0%	73.8%	68.2%
	part time, fixed term	1.6%	1.7%	1.3%	2.3%	1.8%
	self employed	1.3%	1.3%	2.1%	1.1%	1.8%
	NOT EMPLOYED	11.4%	10.6%	12.9%	8.0%	9.0%
Part time, fixed term	full time, open term	5.7%	5.3%	4.5%	5.1%	4.1%
	full time, fixed term	15.1%	11.4%	15.6%	15.6%	17.4%
	part time, open term	4.7%	4.8%	5.1%	3.0%	3.6%
	part time, fixed term	50.8%	59.9%	56.1%	57.9%	55.8%
	self employed	1.9%	1.6%	1.9%	2.1%	2.2%
	NOT EMPLOYED	21.8%	16.9%	16.7%	16.3%	16.8%
Self employed	full time, open term	1.0%	1.2%	1.0%	1.0%	0.9%
	full time, fixed term	1.2%	1.2%	1.4%	1.9%	1.6%
	part time, open term	0.0%	0.1%	0.1%	0.1%	0.1%
	part time, fixed term	0.3%	0.2%	0.1%	0.1%	0.3%
	self employed	92.7%	92.7%	91.8%	92.8%	92.5%
	NOT EMPLOYED	4.8%	4.6%	5.6%	4.1%	4.7%
NOT-EMPLOYED	full time, open term	1.1%	1.0%	1.1%	0.9%	1.1%
	full time, fixed term	3.1%	3.4%	3.7%	3.9%	3.7%
	part time, open term	0.1%	0.1%	0.1%	0.1%	0.1%
	part time, fixed term	0.7%	0.7%	0.6%	0.6%	0.6%
	self employed	1.4%	1.1%	1.0%	1.2%	1.2%
	NOT EMPLOYED	93.6%	93.8%	93.4%	93.3%	93.3%

Source: Author's calculations based on data from Polish LFS data for years 2003-2008.

Those with full time and fixed term contracts are also the least stable groups in the labor market with only 60%-70% of employed continuing the same labor status in the next year. What seems interesting is that these are groups with relatively high probability of entering full time and open term contracts, suggesting that they may consider staying on a fixed term

contract as a form of queuing. It seems that the queuing role of this type of contract tended to increase at least since 2005 (when the observed transitions to full time open term contracts were 13.4%) until 2008 (when they reached 19.2%).

It seems that the way from the least safe (and most probably shadow) part time and fixed term contract to the safest full time and open term contracts leads through full time and fixed term contracts. Although this way seems to be quite cumbersome and risky, it is still better than waiting in unemployment. On the other hand, self-employment seems to be a more long term choice (or necessity) and as such it does not seem to be a form of queuing. The observed incidence of entering a full time/open term contract for the self-employed is as low as for those unemployed.

In order to run an econometric analysis of the relationship between the probability of shadow employment in year "t" and the relative probabilities of various transitions on labor market between year "t" and year "t+1", I have estimated the series of multinomial logistic models in which the labor market status in "t+1" (be it one of types of contract or lack of employment) was the dependent variable and the state on the labor market in "t" ("contract" variable) and the estimated probability of shadow employment ("shadow" variable) in "t" were the main explanatory variables. The standard set of control variables has been applied. As the consequence of such a specification of the model, the sample in the starting period ("t") had to be limited to the employed population only, since a series of variables including the "shadow" variable and the "contract" variable are defined only for those employed.

The results of estimations for the "contract" variable for all years are presented in Table 5. The estimated coefficients should be interpreted as Relative Risk Ratios (RRR) of transition probabilities i.e. the relative risk of transition to state X as compared to the risk of transition to the base category (being the full time, open term employment) is N (where N = the presented coefficient) times higher for the given starting state than for the baseline category (also full time, open term employment). So for example (see the first coefficient in the upper left corner of Table 5) the relative risk of transition to no-employment as compared to the risk of transition to full time/open term employment for those with full time and fixed term contracts is 11.07 times higher than for those with full time/open term contracts.

Table 5 Estimated RRR ratios for transition probabilities among various labor market arrangements depending on the type of contract.

2003- 2004						
Starting state - below	Resulting state - right	No employment vs full time open term employment (FTOP)	Full time fixed term employment vs (FTOP)	Part time open term employment vs (FTOP)	Part time fixed term employment vs (FTOP)	Self Employment vs (FTOP)
Full time fixed term employment		11.1	174.5	3.4	49.3	8.6
Part time open term employment		8.3	6.1	827.0	47.9	9.2
Part time fixed term employment		19.8	99.8	131.7	3277.6	18.3
Self Employment		43.1	56.8	3.9	111.2	7824.1
2004-2005						

	No employment	Full time fixed term employment	Part time open term employment	Part time fixed term employment	Self Employment
Full time fixed term employment	14.8	354.1	2.8	35.9	14.1
Part time open term employment	15.7	5.4	2822.6	78.9	17.0
Part time fixed term employment	23.7	121.7	308.7	4748.3	9.6
Self Employment	49.3	61.0	29.0	90.4	7610.2
2005-2006					
	No employment	Full time fixed term employment	Part time open term employment	Part time fixed term employment	Self Employment
Full time fixed term employment	11.3	155.2	4.7	29.3	8.0
Part time open term employment	12.9	4.7	1689.0	48.8	12.5
Part time fixed term employment	21.8	89.0	334.1	4399.0	8.9
Self Employment	50.4	35.3	18.9	42.4	5101.3
2006-2007					
	No employment	Full time fixed term employment	Part time open term employment	Part time fixed term employment	Self Employment
Full time fixed term employment	15.3	272.7	7.0	70.4	11.6
Part time open term employment	13.1	16.1	1694.2	148.5	11.7
Part time fixed term employment	58.3	177.0	159.0	9063.2	20.4
Self Employment	75.7	95.7	14.3	74.3	9351.2
2007-2008					
	No employment	Full time fixed term employment	Part time open term employment	Part time fixed term employment	Self Employment
Full time fixed term employment	10.3	158.7	4.5	49.5	7.2
Part time open term employment	9.4	10.6	1000.9	99.9	10.3
Part time fixed term employment	39.6	168.6	242.2	10896.8	35.7
Self Employment	80.5	90.9	23.9	206.3	9095.8
Notes: Baseline resulting category – full time open term employment, baseline starting category – full time open term employment, All coefficients in RRR form, All coefficient statistically significant.					

Source: Author's calculations based on LFS data sets from years 2003-2008.

The results presented in Table 5 are not surprising. At first the relative risk of transition to the same state as in previous year is always much (even thousands in some cases) higher than to full time/open term employment. Such high coefficients result from very low probability of transition from full time/open term contract to any form of contract and also from low probabilities of transitions from any other state to full time/open term contract.

In addition, the relative risk of transition to non-employment increases for any type contract other than a full time/open term one. What is most interesting is that this relative risk is the highest for the self-employed. Partially it is a result of very low probability of transition from self-employment to full time/open term employment, but on the other hand it also means that if one treats the open term/full time employment as the "ideal" state, engagement in self-employment is in relative terms the "worse" possible option with the highest risk to end up without any employment next year instead of reaching the goal. So it proves the earlier observations drawn from the analysis of actual labor market transitions (Table 4).

It is important to underline that the estimated relative probabilities are very volatile depending on the year of estimation and that the obtained coefficients do not seem to follow any easily identifiable trend. This suggests that we should treat the results obtained as more qualitative than quantitative and that we should not treat them as estimates of actual relations.

The results for the "shadow" variable (Table 6) are also presented in Relative Risk Ratio terms and they can be interpreted as the change of relative risk of given transition as compared to transition to full time/open term employment resulting from the unit change of probability of shadow employment.

The estimated relative risk ratios seriously change from year to year and it may be related to high correlation of the "shadow" variable with the "contract" variable. In this model, they had to be used together in order to obtain interpretable results for the "shadow" variable as the model specifications where only this variable was used resulted in coefficients close to infinity or zero depending on the base categories. Therefore, as in case of the "contract" variable, one should treat these results more as qualitative indications of general tendencies than as estimates of actual relations.

In any case, it seems that one may try to draw some systematic observations:

(1) From the point of view of its dependence from shadow employment, transition to part time/open term employment is not qualitatively different than transition to full time/open term employment,
(2) Shadow employment seems to mostly influence the relative probability of transition to self-employment (as compared to full time/open term employment) although even this coefficient is not statistically significant for all years,
(3) Shadow employment also seems to positively influence the relative probability of transition out of employment.

These results seem to suggest that shadow employment is either the way to self-employment (be it registered or not) or to unemployment. It does not seem to be the path to full time/open term contracts or to any other type of open term contracts. It is important to underline that these results are obtained with a model specification where one controls for the type of contract, i.e., they may be interpreted as "pure" effects of shadow employment probability on the relative transition probabilities.

Table 6 - RRR for transitions to given type of contract compared to full time/open term contract resulting from unit change in shadow employment probability

Year	No employment versus full time open term (FTOP)	Full time fixed term employment versus (FTOP)	Part time open term employment versus (FTOP)	Part time fixed term employment versus (FTOP)	Self Employment versus (FTOP)
2004	22.7	6.1	insignificant	5.6	20.9
2005	16.7	3.4	insignificant	insignificant	263.4
2006	32.5	7.6	insignificant	10.1	287.7
2007	insignificant	insignificant	insignificant	insignificant	51.3
2008	5.3	insignificant	insignificant	insignificant	insignificant

Source: Author's calculations based on LFS data sets from years 2003-2008.

5. Conclusions

The estimated share of shadow workers in total employment in Poland in years 2003-2008 was increasing until 2006 and then started to decrease in the years 2007 and 2008. The trend changed, although throughout the entire period of analysis the Polish labor market was booming. It seems that in the first period (until 2006), the labor market situation was still difficult and workers were still very likely to accept the fixed term jobs offered by companies. At the same time companies did not have to compete for workers with better working conditions. After 2006, when the labor market situation started to improve very dynamically, the companies started to offer them better (more stable) jobs, and workers were more reluctant to accept fixed term jobs. It is logical to assume that similar patterns of behavior were also observed in shadow employment, which (by most of the related literature) is assessed as counter-cyclical.

The same pattern has been observed for all main groups of employers, although not for all groups of employees. Decreasing probability of entering shadow employment for the youngest cohort (24 and below) might be related to demography and increasing participation in tertiary education. On the other hand, increasing participation in shadow employment among the oldest workers (65 and above) can have its sources in more rigid regulations concerning disability pensions.

Throughout the entire period, working in the shadow economy (or working under any other type of contract than full time/open term) increased the probability of losing a job, however as the labor market situation improved the relative (and as a consequence also the absolute) position of those in shadow employment improved as well. As soon as the labor market started to deteriorate, the relative situation of those in shadow employment started to deteriorate again.

Those entering employment tend to be engaged in shadow employment (or other non-standard working contracts) than those with higher employment tenures. It seems however that as soon as the labor market improves, the relative importance of being a new employee decreases. It means that more prevalent shadow employment in the Polish labor market in years 2003-2006 did not necessarily apply only to new workers, but to all employed.

We also found some evidence that engaging in non-standard dependent employment can be treated as a form of queuing for more stable employment contracts. It seems that the way from the least safe (and most probably shadow) part time and fixed term contract to the safest full time and open term contracts leads through full time and fixed term contracts. Although this way seems to be quite cumbersome and risky, it is still better than waiting in unemployment.

On the other hand, self-employment seems to be a more long term choice (or necessity) and as such it does not seem to be the form of queuing. The observed incidence of entering a full time/open term contract for the self-employed is as low as for those unemployed. Additionally, although the relative risk (as compared to the risk of transition to full time/open term employment) of transition to non-employment is higher for any non standard working contract, this relative risk is the highest for the self-employed. It means that if one treats open term/full time employment as the "ideal" state, engagement in self employment is in relative terms the "worse" possible option with the highest chances to end up without any employment next year instead of reaching the goal.

Our results also suggest that shadow employment is either the way to self-employment (be it registered or not) or to unemployment, it does not however seem to be the path to full time

open term contracts or to any other type of open term contracts. It is important to underline that these results are obtained with model specification where one controlled for the type of contract i.e. one may interpret them as the "pure" effect of shadow employment probability on the relative transition probabilities.

The results obtained are in line with one of the main conclusions of the CASE study from 2007 suggesting that shadow employment is more a way of coping with lack of other employment opportunities than an equivalent or even superior alternative to any legal employment contracts. However, it is worth noting that those who enter shadow employment are also the more active part of the group having problems with finding full time/open term employment. They are much more inclined to cope with their situation by entering some form of self-employment than to stay passive and depend on social assistance.

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